

GRADE 2 STANDARDS AND LEARNING ACTIVITIES

SCIENTIFIC THINKING AND INQUIRY

2.1. Broad Concept: Scientific progress is made by asking relevant questions and conducting careful investigations. As a basis for understanding this concept, and to address the content in this grade, students should develop their own questions and perform investigations.

Students:

1. Describe objects as accurately as possible and compare observations with those made and reported by others.
2. Make new observations when there is disagreement among observers or among successive observations.
3. Demonstrate the ability to work with a team, but still reach and communicate one's own conclusions about findings.
4. Use tools, such as thermometers, magnifiers, rulers, or balances, to investigate, observe, measure, design, and build things.
5. Measure objects in standard units and include units in reports of measurements with simple calculations (e.g., 3 cm + 3 cm = 6 cm).
6. Draw pictures and write brief, coherent descriptions that correctly portray key features of an object.
7. Recognize and explain that people are more likely to believe ideas when they are supported by observations.
8. Explain that some events can be predicted with near certainty, such as a sunrise and sunset, and some cannot, such as storms.
9. Explain that sometimes a person can make general discoveries about a group of objects or organisms, such as insects, plants, or rocks, by studying just a few of them, even though the group may vary in details. Understand that this is not inconsistent with the existence of biological variation.
10. Make simple line and bar graphs (e.g., track daily changes in outdoor air temperature).

Examples *Student teams predict what a simple tool or object (e.g., pliers, letter opener, paperweight) might be used for by its shape and other characteristics (2.1-1).*

Students measure the jumps of different students in the class with different tools (e.g., ruler, yardstick, paintbrush, pencil). They report the data, and discuss the differences between measurements with different tools (2.1-5).

Students discuss ancient myths about the movement of the sun, stars, or moon; gravity; the shape of the world. They explain the observations that might have led to the myths, and they distinguish those from observations we might make today (2.1-7).

Students design and build an ant farm. They observe how ants use their senses and how they communicate to each other the location of a food source (2.1-9).

Students record their local weather information (e.g., daily temperature, how windy it is, kind of precipitation) for two weeks. They chart the results on line graphs and bar graphs. They repeat this for another two-week interval and compare and contrast the results against the first interval (2.1-10).

SCIENCE AND TECHNOLOGY

2.2. Broad Concept: Although each of the human enterprises of science and technology has a character and history of its own, each is dependent on and reinforces the other. As a basis for understanding this concept,

Students:

1. Give examples of how our lives would be different without such technologies as automobiles, computers, and electric motors.

Example *Students choose a favorite technology. They report on the components of each, and/or what needed to be invented or thought of before that technology could come to be. They note the differences between past and modern technologies and ideas (2.2-1).*

EARTH SCIENCE

2.3. Broad Concept: Weather can be observed, measured, and described. As a basis for understanding this concept,

Students:

1. Explain how weather patterns occur continually on Earth.
2. Explain that air temperature, humidity, wind speed and direction, and precipitation make up the weather in a particular place and time.
3. Investigate and compare weather changes from day to day and place to place.
4. Describe and chart that the temperature and amounts of rain or snow vary in the same months in each place every year.
5. Explain the difference between weather and climate.
6. Describe the differences among the various forms of precipitation (rain, snow, sleet, and hail).
7. Cite specific examples of how human beings protect themselves from adverse weather conditions through different means.

Examples *Students collect satellite pictures from a weather station or local weather Web site. They use the information to explain the patterns of change from fall to winter in terms of weather, and the position and movement of objects in the sky (2.3-1).*

Students construct various weather station instruments (wind gauge, barometer, and anemometer), record data from them, and draw conclusions about what they find (2.3-2).

Students collect weather maps from the local newspaper over a two-week period. They note the effects from day to day, and hypothesize about which conditions (air temperature, humidity, wind speed, etc.) might have been responsible for changes in weather (2.3-2 and 2.3-3).

Students collect daily temperature and precipitation data at school from three city locations around the country or world. They take averages of the daily data from all three locations. They graph the data and discuss how the long-term weather data and patterns become a climate (2.3-5).

EARTH SCIENCE (CONTINUED)

Students describe each kind of precipitation by speaking in the first person as that kind, e.g., "As the snow [rain, hail], I" Students include in their descriptions differing effects and environmental conditions for the varying kinds of precipitation (2.3–6).

Students research and describe five different homes found in varied weather regions around the world, such as the torrid, temperate, tropical, and arctic (2.3–7).

2.4. Broad Concept: The Earth's resources can be conserved. As a basis for understanding this concept,

Students:

1. Recognize and explain how certain materials – such as recycled paper, cans, and certain types of plastic containers – can be used again.
2. Explain how discarded products contribute to the problem of waste disposal and how recycling and reuse can help solve this problem.

Examples *Students create colorful flowerpots and/or vases from cans and recycled containers (2.4–1).*

Students explore Recycle City's Web site (www.epa.gov/recyclecity) to track the many changes after recycling efforts have begun (2.4–1).

Students interview the school custodians or janitors about the amount, frequency, and nature of waste disposal at the school (2.4–2).

PHYSICAL SCIENCE

2.5. Broad Concept: Materials come in different states, including solids, liquids, and gases. As a basis for understanding this concept,

Students:

1. Recognize that solids have a definite shape; liquids and gases take the shape of their containers.
2. Recognize that materials can be manipulated to change some of their properties (e.g., cooling or heating).
3. Investigate and explain that water, like many other substances, can be a liquid, a solid, or a gas, and it can transform from one state to another.
4. Explain how water can be transformed from one state to another by adding or taking away heat energy.
5. Describe when water is frozen into ice and the ice is allowed to melt, the amount of water is the same as it was at the beginning.
6. Investigate and explain how water left in an open container seems to disappear into the air (evaporation), but water in a small, closed container does not disappear.

Examples *Students melt ice cubes in different kinds of containers and then freeze the water in those same containers (2.5–1 and 2.5–3).*

Students design one container for each of the states of matter, taking into account what material properties are important (e.g., size, shape, flexibility, etc.) (2.5–1).

PHYSICAL SCIENCE (CONTINUED)

Students use modeling clay to make a small object, which is then fired in an oven. They also make ice sculptures by blowing slowly through straws, using the straws as "chisels" (2.5-2).

Students discuss what happens when they place their hands in the freezer and they cool off (i.e., heat is taken from their hands, rather than cold be "given" to them) (2.5-4).

Students place equal amounts of water in same-size containers in direct sunlight, one container with a clear lid and one without. They observe the changes in the water, including the condensation of water on the inside of the covered container and level of water in both containers (2.5-6).

LIFE SCIENCE

2.6. Broad Concept: Plants and animals have structures that serve different functions in growth, survival, and reproduction. As a basis for understanding this concept,

Students:

1. Observe and identify the visible, external features of plants and animals and describe how these features help them live in different environments.
2. Observe and cite examples of how some animals and plants change their appearance as the seasons change.

Examples *Students gather information from a botanical garden Web site to create a picture dictionary of the external physical differences of plants from different regions of the world, such as desert, rain forest, ocean, and plain (2.6-1).*

Students make a series of drawings and explain the seasonal succession of plants in a field near the school (2.6-2).

Students research how birds and animals produce different colors of fur or feathers depending on the time of year (2.6-2).

2.7. Broad Concept: Living things depend on one another and their environment for survival. As a basis for understanding this concept,

Students:

1. Observe and describe how animals may use plants, or even other animals, for shelter and nesting.
2. Explain that food for almost all kinds of animals can be traced through a food web back to green plants.
3. Observe and explain that plants and animals both need to take in water, animals need to take in food, and green plants need light.
4. Recognize and explain that materials in nature, such as grass, twigs, sticks, and leaves, can be recycled and used again, sometimes in different forms, as birds do in making their nests.

LIFE SCIENCE (CONTINUED)

5. Observe and describe how the local environment (water, dry land) supports a wide variety of plants and animals, some unique to the Chesapeake Bay.
6. Cite examples of how animals and plants sometimes cause changes in their surroundings. While some of these changes are easy to see, some are very small and hard to recognize, even though they can be very important.
7. Recognize that there is a vast world of living things, called *microorganisms*, too small to see with the unaided eye.
8. Recognize that most microorganisms do not cause disease and many are beneficial (e.g., yeasts, bacteria of the soil).

Examples *Students identify different birds in the world and their nests. They make models and create a nest museum (2.7-1).*

Students write and illustrate a creative story to explain the food chain to a younger brother or sister (2.7-2).

Students collect plants. They make a detailed drawing of a plant, including identifying and labeling its major structures (i.e., leaves, flowers, stems, roots, seeds). They describe the function of each (2.7-3).

Students call, interview, and invite a member of the U.S. Botanic Garden or the National Arboretum to discuss how they reuse dead plant matter (2.7-4).

Students discuss the effects of "invasive species," such as the snakehead fish or barnacles and mollusks on the bottoms of international boats (2.7-6).

Students design and build a compost bin (with support from the teacher). They use a thermometer to measure the temperature rise during composting. Students discuss where heat (energy) comes from (decomposers metabolize energy stored by producers and consumers) (2.7-7).

Students discuss the role of E coli in the human digestive system (2.7-8).

2.8. Broad Concept: Many different types of plants and animals inhabit the Earth. As a basis for understanding this concept,

Students:

1. Recognize and explain that living things are found almost everywhere in the world in habitats such as the oceans, rivers, rain forests, mountain ranges, arctic tundra, farms, cities, and other environments. Recognize that some habitats are extreme, such as the very deepest parts of the oceans or inside hot springs.
2. Recognize that the numbers and types of living things can vary greatly from place to place.
3. Give examples of the many kinds of organisms that lived in the past that are now extinct (have died out), and explain how these organisms were similar to, and others very different from, organisms that are alive today.
4. Describe that plants and animals in our city have habitats that are essential to their survival. For instance, the schoolyard is a habitat that provides the basic needs for a variety of plants and animals.

LIFE SCIENCE (CONTINUED)

Examples *Students research "extremophiles" – single-celled microbes – that inhabit almost all areas on the planet (2.8-1).*

Students discuss the environments or habitats of different regions of the planet and make a list of the advantages or adaptations that organisms would need to survive there. Make sure that microbes and plants are considered as well as animals (2.8-2).

Students visit the National Museum of Natural History and follow the numerous paths to extinction, such as the Permian extinction and the K-T event (2.8-3).

Students consider the effects on local animals and plants if they took away a certain condition, such as warm temperatures, food sources, precipitation, or sunlight hours (2.8-4).

2.9. Broad Concept: Humans have predictable life cycles. As a basis for understanding this concept,

Students:

1. Recognize and discuss that people are more like one another than they are like other animals. Each type of animal is more like its relatives (family) than it is like the animals of other types (or families).
2. Explain that humans, like all living things, reproduce offspring of their own kind.
3. Observe that and describe how offspring are very much, but never exactly, like their parents and like other offspring of the same parents.
4. Recognize that people have a wide but not unlimited range of external features, such as differences in their size, shape, and color of hair, skin, and eyes.

Examples *Students compare their anatomy, behavior, structure, and skills to a chimp, a mouse, a fish, and a bacterium cell. As a class, they draw a comparison chart between those organisms (2.9-1).*

Students make a brief family tree and describe predominant traits that run in their families (2.9-2 and 2.9-3).

Students collect data from classmates on height, hair color, and eye color, then chart or graph the information so that the information can be organized and shared (2.9-4).